Symmetric Orthogonal Representations for Cayley Graphs

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This talk is concerned with the problem of finding orthogonal representations for Cayley graphs. Finding an orthogonal representation for a graph is equivalent to finding a corresponding Hermitian positive semidefinite matrix, and so an orthogonal representation bounds the minimum positive semidefinite rank of the graph from above. This talk will describe how to use representation theory to extend the graphical symmetry inherent in the definition of a Cayley graph into the linear algebraic context. This allows us to extend known results on circulant graphs to all abelian Cayley graphs. Extensions to non-abelian Cayley graphs are possible, but much harder, and open questions will be presented.

Keywords: minimum rank, positive semidefinite rank, orthogonal representation, Cayley graph